1 Description of the model. Field theoretic formulation

$$S_v(v^{'}, v) = v^{'} D_v v^{'}/2 + v^{'}\{-\nabla_t + \nu_0 \partial^2\} v + \omega_0 \nu_0^3 v_i^{'}(\partial_i \theta)\partial^2 \theta \tag{1}$$

$$S(v, v^{'}, \theta, \theta^{'}) = S_v(v^{'}, v) + \theta^{'} D_\theta \theta^{'}/2 + \theta^{'}\{-\nabla_t + k_0 \partial^2\}\theta \tag{2}$$

Feynman rules.

$$\langle v, v^{'}\rangle_0 = \langle v^{'}, v\rangle_0^T = (-i\omega + \nu_0 k^2)^{-1} \tag{3}$$

$$\langle v, v\rangle_0 = P_{ij} D_0 k^{4-d-y}(-i\omega + \nu_0 k^2)^{-2} \tag{4}$$

$$\langle \theta, \theta^{'}\rangle_0 = \langle \theta^{'}, \theta\rangle_0^T = (-i\omega + \nu_0 k^2)^{-1} \tag{5}$$

$$\langle \theta, \theta\rangle_0 = K_0 k^{2-d-y}(-i\omega + \nu_0 k^2)^{-2} \tag{6}$$

$$\langle v_i^{'}, \theta, \theta\rangle_0 = -i\omega_0 \nu_0^3 [p_i k^2 + p^2 k_i] \tag{7}$$

p,k - momentum of field θ.

$$\langle \theta^{'}, v_i, \theta\rangle_0 = -ip_i \tag{8}$$

p - momentum of field $\theta^{'}$, because $\partial_i v_i = 0$.

$$\langle v_i^{'}, v_k, v_s\rangle_0 = -i[p_k \delta_{is} + p_s \delta_{ik}] \tag{9}$$

p - momentum of field $v^{'}$.

2 Canonical dimensions, UV divergences and the renormalization

F	v	$v^{'}$	θ	$\theta^{'}$	ν	ω, ω_0	D, D_0	k, k_0	g, g_0	u
d_F^k	-1	$d+1$	$-\frac{1}{2}z+1$	$d+\frac{1}{2}z-1$	-2	z	$y-6$	-2	y	0
d_F^ω	1	-1	$-\frac{1}{2}$	$\frac{1}{2}$	1	0	3	1	0	0
d_F	1	$d-1$	$-\frac{1}{2}z$	$d+\frac{1}{2}z$	0	z	y	0	y	0

The role of the coupling constants is played by the parameters $g_0 = D/\nu_0^3, u_0 = k_0/\nu_0$, and ω_0. The model is logarithmic at $y = z = 0$.